

What is claimed is:

1. An automatic clutch control device comprising a clutch connecting/disconnecting actuator for driving a clutch, disposed between an output shaft of a power source of a vehicle and an input shaft of a transmission, so as to be connected or disconnected, and clutch control means that controls the clutch connecting/disconnecting actuator comprising:

wheel speed obtaining means for obtaining a wheel speed of each wheel of the vehicle; and

deceleration slip related amount obtaining means for obtaining a driving wheel deceleration slip related amount that shows a degree of a slip of the driving wheel in a deceleration direction based upon each wheel speed, wherein the clutch control means is configured to change the state of the clutch to a half-connecting state or to a disconnecting state according to the driving wheel deceleration slip related amount when the clutch is in a connecting state.

2. An automatic clutch control device claimed in Claim 1, wherein the clutch control means is configured to change the state of the clutch to the half-connecting state in case where the degree of the slip of the driving wheel in the deceleration direction shown by the driving wheel deceleration slip related amount is not less than a first degree but less than a second degree that is greater than the first degree, while to change the state of the clutch to the disconnecting state in case where the degree of the slip is not less than the second degree.

3. An automatic clutch control device that is applied to a vehicle having vehicle stabilizing control executing means for setting a target wheel speed related amount of each wheel in accordance with a running state of the vehicle and executing a vehicle stabilizing control for controlling braking force exerted on each wheel such that an actual wheel speed related amount of each wheel becomes the target wheel speed related amount, and is provided with a clutch connecting/disconnecting actuator for driving a clutch, disposed between an output shaft of a power source of the vehicle and an input shaft of a transmission, so as to be connected or disconnected, and clutch control means that controls the clutch connecting/disconnecting actuator, comprising:

convergence rate obtaining means for obtaining a convergence rate showing a quality of the convergence of the actual wheel speed related amount of a driving wheel when the actual wheel speed related amount of the driving wheel converges to the target wheel speed related amount of the driving wheel from a state where the actual wheel speed of the driving wheel is smaller than the wheel speed corresponding to the target wheel speed related amount of the driving wheel when the vehicle stabilizing control is executed,

wherein the clutch control means is configured to change the state of the clutch from the half-connecting state or to the disconnecting state according to the convergence rate when the vehicle stabilizing control is executed and the clutch is in the connecting state.

4. An automatic clutch control device claimed in Claim 3,

wherein the convergence rate showing a quality of the convergence is a convergence period, from when the vehicle stabilizing control is started from a state where the actual wheel speed of the driving wheel is smaller than the wheel speed corresponding to the target wheel speed related amount of the driving wheel, to when the actual wheel speed related amount is completed to be converged to the target wheel speed related amount.

5. An automatic clutch control device claimed in Claim 3, wherein the clutch control means is configured to change the state of the clutch to the half-connecting state when the degree of the deterioration of the convergence shown by the convergence rate is not less than a first degree but less than a second degree that is greater than the first degree, and to change the state of the clutch to the disconnecting state when the degree of the deterioration is not less than the second degree.

6. An automatic clutch control device comprising a clutch connecting/disconnecting actuator for driving a clutch, disposed between an output shaft of a power source of a vehicle and an input shaft of a transmission, so as to be connected or disconnected, and clutch control means that controls the clutch connecting/disconnecting actuator comprising:

driving system vibration determining means for determining whether a predetermined vibration occurs on a driving system from the power source to a driving wheel when the clutch is in the connecting state and the vehicle is accelerated by the power from the power source,

wherein the clutch control means is configured to change the state of the

clutch to the half-connecting state or to the disconnecting state according to the degree of the predetermined vibration when the clutch is in the connecting state and the predetermined vibration occurs.

7. An automatic clutch control device claimed in Claim 6, wherein the degree of the predetermined vibration is a continuation time of the predetermined vibration.

8. An automatic clutch control device claimed in Claim 6, wherein the predetermined vibration has an amplitude more than a predetermined amplitude and has a frequency substantially equal to a resonance frequency of the entire driving system.

9. An automatic clutch control device comprising a clutch connecting/disconnecting actuator for driving a clutch, disposed between an output shaft of a power source of a vehicle and an input shaft of a transmission, so as to be connected or disconnected, and clutch control means that controls the clutch connecting/disconnecting actuator comprising:

spinning state determining means for determining whether the vehicle is in a spinning state or not,

wherein the clutch control means is configured to change the state of the clutch to the half-connecting state or to the disconnecting state when the clutch is in the connecting state and the vehicle is in the spinning state.

10. An automatic clutch control device claimed in Claim 9,

wherein the spinning state determining means is configured to determine that the vehicle is in a spinning state when a state where a yaw rate of the vehicle is not less than a predetermined yaw rate reference value continues for a time longer than a predetermined spin determining reference time.

11. An automatic clutch control device that is applied to a vehicle having traction control executing means for setting a target wheel speed related amount of a driving wheel when a slip of the driving wheel in an accelerating direction excessively occurs and executing a traction control for controlling braking force exerted on the driving wheel such that an actual wheel speed related amount of the driving wheel becomes the target wheel speed related amount, and is provided with a clutch connecting/disconnecting actuator for driving a clutch, disposed between an output shaft of a power source of the vehicle and an input shaft of a transmission, so as to be connected or disconnected, and clutch control means that controls the clutch connecting/disconnecting actuator, comprising:

revolution speed obtaining means for obtaining a revolution speed of the power source,

wherein the clutch control means is configured to change the state of the clutch to the half-connecting state or to the disconnecting state when the clutch is in the connecting state, the traction control is executed and the revolution speed is not more than a predetermined value.